



DEPARTMENT OF THE ARMY

U.S. Army Corps of Engineers
WASHINGTON, D.C. 20314-1000

REPLY TO
ATTENTION OF:

30 JUN 1997

CECW-EG

MEMORANDUM FOR SEE DISTRIBUTION

SUBJECT: Geotechnical Activities in Support of Levee Certification for Federal Emergency Management Agency (FEMA) Flood Insurance Purposes

1. References:

a. Federal Emergency Management Agency, National Flood Insurance Program (Regulations for Floodplain Management and Flood Hazard Identification), Revised as of 1 October 1990, Federal Emergency Management Agency, Washington, D.C.

b. Letter, CECW-P/CECW-E, Subject: Guidance on Levee Certification for the National Flood Insurance Program, dated 10 April 1997.

2. To ensure that the evaluation of the geotechnical aspects of levee certification for FEMA is performed in a consistent manner, the enclosed guidance is provided for use by all Major Subordinate Commands (MSC). This guidance is also applicable to requests for levee certification made by local agencies for the same purpose. The certification process of a levee system for flood insurance purposes requires the effort of a multidisciplinary team that includes hydraulics, hydrology, geotechnical, structural and operational personnel. Where States have standards for design, construction and operation, those standards will be considered in our certification process.

3. Levee certification for flood insurance purposes can be described as a technical judgement that the levee system provides a high degree of reliability of containing the FEMA Base Flood (median 1% chance) water surface profile. FEMA will request a "levee certification" from the Corps by a letter sent directly to the district office. The letter will usually state:

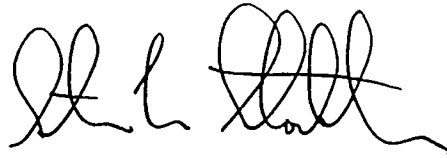
".....Please provide this office with the current certification as to whether the design and maintenance of this levee are adequate to credit it with the ability to pass the FEMA Base Flood. Please note that such a statement does not constitute a warranty of performance, but rather the Corps current position of the levee system's design adequacy..."

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4. The enclosed guidance outlines the policy, practice and procedures for the geotechnical evaluation and assessment of levees for certification process in conjunction with flood insurance studies.

FOR THE COMMANDER:



Encl

STEVEN L. STOCKTON, P.E.
Chief, Engineering Division
Directorate of Civil Works

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**Geotechnical Activities in Support of Levee Certification for Federal
Emergency Management Agency (FEMA) National Flood
Insurance Purposes (NFIP)**

1. **Purpose.** To provide guidance on the requirements for the geotechnical portion of the inspection, evaluation and certification of existing levees for the FEMA National Flood Insurance Program.

2. **References:**

- a. ER 1130-2-339, Inspection of Local Protection Projects
- b. EM 1110-2-1913, Design and Construction of Levees
- c. EM 1110-2-19014, Design, Construction and Maintenance of Relief Wells
- d. ETL 1110-2-546, Provisions to Set Final Levee Grade for Projects Formulated Using Risk-Based Analysis.

3. **Existing Levees - No Risk-Based Analysis.** This evaluation is for a levee where the top of protection is for a specified water surface profile plus three feet of freeboard. The general rule is that if the levee can contain the water surface profile that corresponds to the FEMA Base Flood (median one percent chance flood) with three feet of freeboard, it should be certified. A detailed geotechnical evaluation and review of existing conditions must be made to determine if the levee system can contain the base water surface profile or at what lower elevation the levee is likely to fail. The review of records, inspection and evaluation for certification purposes should address the following guidance as a minimum:

a. **Review of available data and information:**

- Geologic maps, boring logs, and groundwater history
- Aerial photographic records
- Original design and construction records
- Records of utility crossings
- Annual surveys of top of protection and cross sections
- Water surface elevations and duration of previous high water levels
- Levee performance (instrumentation and visual records) before, during and after these previous high water
- Performance and maintenance of underseepage control measures
- Flood fighting records

- Design and construction records of remedial or other project modifications
- Natural drainage, interior drainage and ponding areas
- Operations and Maintenance Manual
- Maintenance records

b. **Field inspection.** The field inspection is intended to be the basis for the evaluation and will verify the physical aspects and the maintenance condition of the project levee. This inspection should document all new observations of encroachments, animal burrows, condition of the top of levee, evidence of erosion on and adjacent to the levee, excavations in or adjacent to the levee for ponding, adequacy of the foundation and tie-in for closure structures, evidence of seepage, piping, sloughs or other instability and overall level of maintenance. Interviews with local residents and maintenance personnel involved in routine inspections and flood fighting activities are important to obtain eye witness reports of levee performance. It is important to prepare thorough documentation to include photographs of the inspection which will become part of the permanent documentation for the project.

4. **Existing Levees Formulated with Risk-Based Analysis.** In this case the relevant water surface profile is established using the reliability of protecting against the 1% chance annual flood event. Freeboard is not included, however, deterministic allowances for geologic subsidence, settlement, shrinkage, cracking plus construction and operational tolerances are generally added to the nominal top of protection established by the risk-based analysis..

a. **Review of available data and information.** Same as in paragraph 3. a. above. It is important to review the construction control records with particular attention to the as-built profiles and cross sections.

b. **Field inspection.** Same as in 3. b. Above. However, for this condition the maintenance of the top of levee is critical since only a limited amount of settlement or rutting may bring it below the water surface profile.

5. **Levee Evaluation and Certification.** A thorough evaluation of the levee by reach will be made and be the basis for certification. In States that have design, construction and operational maintenance requirements, these criteria will be incorporated into the certification process. In cases where the levee is certified, but minor deficiencies are observed, the organization responsible for ownership should be notified in writing. For those cases where the levee can not be certified, both FEMA and the owner should be notified in writing. This notification should outline the corrective measures required to meet certification.